

Leaf-litter Thysanoptera of the subtribe Williamsiellina (Phlaeothripidae)

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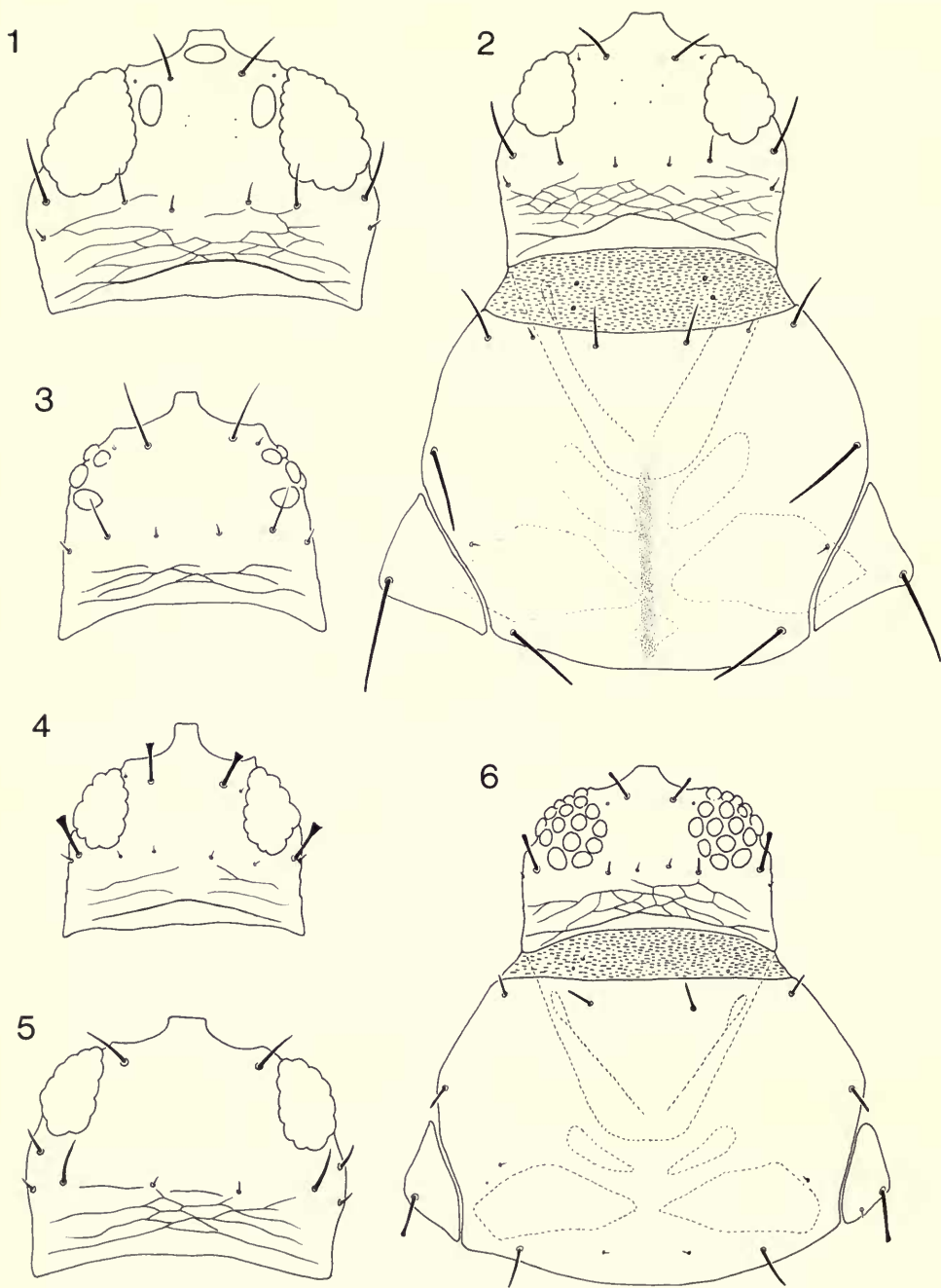
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Synopsis

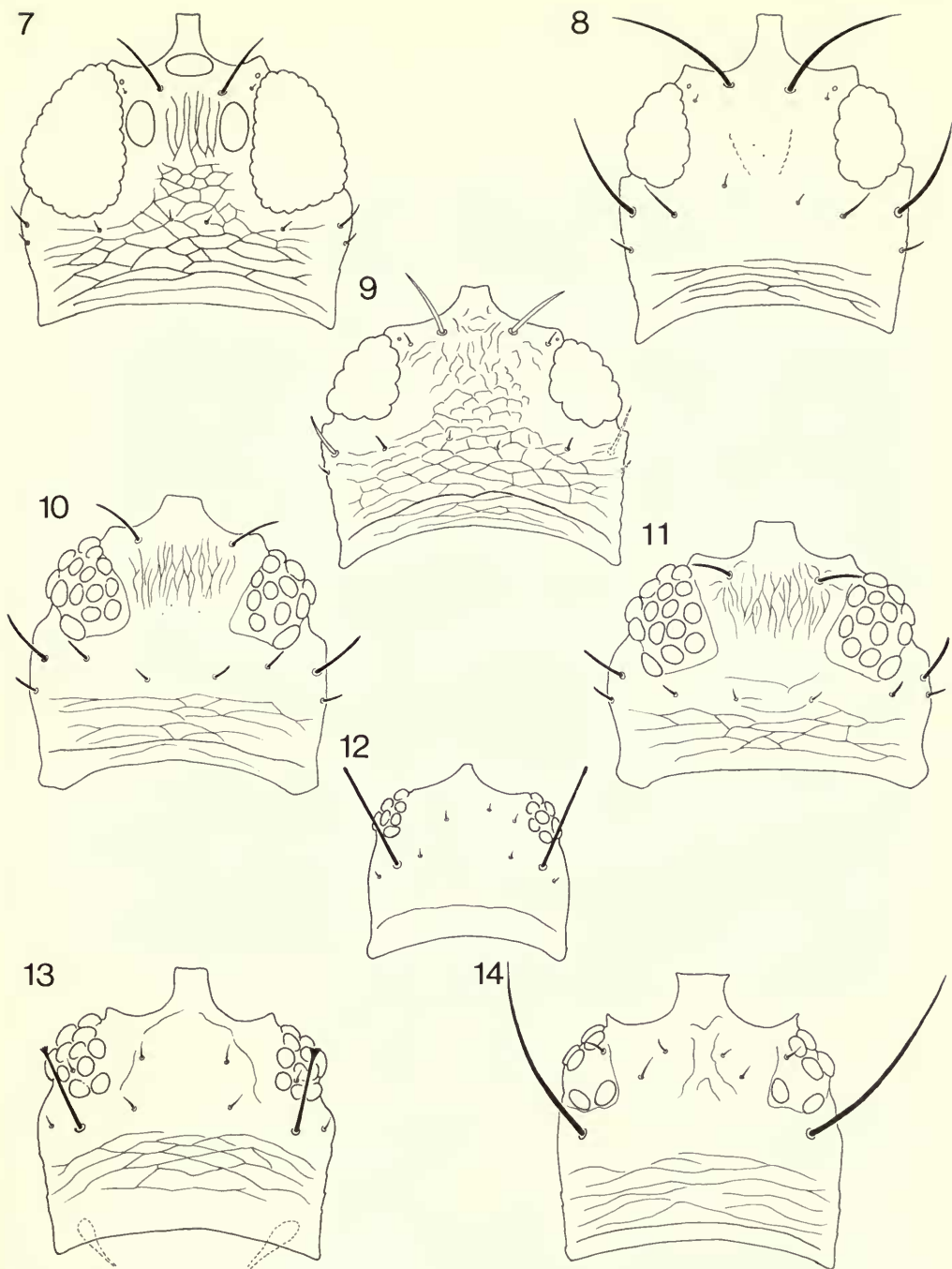
Species in the Williamsiellina have shorter maxillary stylets than other Phlaeothripidae, the stylets being restricted to the mouth cone as in the sub-order Terebrantia. These species live in leaf litter and on dead wood, mainly in the tropics, and probably feed on fungal hyphae. *Williamsiella bicoloripes* apparently feeds on the fungal component of lichens without digesting the green algae. Keys are provided to the seven genera and 29 species in this subtribe. One genus is recalled from synonymy, two genera are placed in synonymy, four new species are described and six new combinations are established. As a result of this reclassification *Sophiokothrips*, *Williamsiella* and *Zaxenothrips* are restricted to New World species, and *Nanothrips* is restricted to Old World species (except *bicolor*).

Introduction

Tubuliferous Thysanoptera usually have much longer stylets than the species in the Terebrantia, indeed the maxillary stylets in many genera are retracted into the head as far as the compound eyes and in some specialized forms are even coiled or convoluted (Mound, 1970b). However, the stylets of the species in the Williamsiellina usually lie posterior to the vertex, or even posterior to the anterior margin of the pronotum when viewed from the dorsal surface (Figs 2, 6, 13). These stylets are thus restricted to the mouth cone as they are in the Terebrantia. The only other group of Tubulifera with stylets reduced to a comparable length is the genus *Antillothrips* in the tribe Haplothripini. This is an unrelated genus found on Gramineae throughout the tropics (Pitkin, 1976), apparently feeding on leaf tissue.



Figs 1-6 Heads of *Nanothrips* species. (1) *kibbyi* ♀ macroptera; (2) *kibbyi* ♂; (3) *parviceps* ♀; (4) *bicolor* ♀; (5) *terminalis* ♀; (6) *boltoni* ♀.



Figs 7–14 Heads of Williamsiellina species. (7) *Sophiothrips spadix* ♀ macroptera; (8) *S. spadix* ♂; (9) *S. spadix* ♀ microptera; (10) *Zaxenothrips peculiaris* ♂; (11) *Z. peculiaris* ♀; (12) *Pluthirothrips morgani* ♀; (13) *P. jacoti* ♀; (14) *Williamsiella bicoloripes* ♀.

The species of the Williamsiellina (a subtribe of the Hoplothripini) are found in leaf litter or on dead branches in the tropics and warm temperate parts of the world. They probably feed on fungal hyphae or the breakdown products associated with hyphal decay, although *Williamsiella bicoloripes* apparently feeds on the fungal component of lichen. The author has collected this species from the stems of a live *Hibiscus* bush in Trinidad which were covered in lichen. The gut contents of this species frequently contain large quantities of green pigment which shows no signs of undergoing digestion, and which is probably derived from chloroplasts of unicellular algae.

The members of this subtribe are amongst the smallest known Tubulifera. The head is particularly small, often much shorter than wide, and the tube is also short. Most individuals are apterous and have the pterothorax with its internal furcae, as well as the pelta, reduced. However, the pronotum is often enlarged, much larger than the head. The males exhibit allometric growth patterns in *Nanothrips*, *Sophiothrips* and *Zaxenothrips*, and moreover in these genera they sometimes bear an unusual conical tubercle on the posterior margin of tergite nine and a similar tubercle on the ventral surface of the head between the eyes.

No key has been published to the members of this group except for that by Stannard (1968) which includes the seven species recorded from eastern North America. Moreover there has been little agreement on the status of the genera. Hood (1954a) treated both *Nanothrips* and *Zaxenothrips* as synonyms of *Sophiothrips* and although this was followed by Ananthakrishnan (1969) *Zaxenothrips* is used by Stannard (1968) and all three genera are referred to by Zur Strassen (1974). These genera can be distinguished by means of the key given below only as a result of the transfer of several species out of *Sophiothrips*. As interpreted here *Sophiothrips*, *Williamsiella* and *Zaxenothrips* include only New World species whereas *Nanothrips* includes only Old World species (except *bicolor* from Florida). Moreover *Phthirotithrips* includes six New World species together with *pediculus* from Liberia and *jacoti* from Angola. This congruence of distribution and morphological characters is taken to reinforce the present generic concept. These genera could be divided into smaller groups, but in the opinion of the present author a series of monobasic genera would serve little practical purpose. The two genera *Pueblotithrips* and *Sophikotithrips* may not be related to the other members of this group.

Depositories

The following abbreviations have been used for depositories. The author is grateful to the curators of these collections for their support and encouragement. AMG – Albany Museum, Grahamstown, South Africa (Mr C. Jacot-Guillarmod); BMNH – British Museum (Natural History); FSAC – Florida State Arthropod Collection, Gainesville, U.S.A.; INHS – Illinois Natural History Survey, Urbana, U.S.A.; IPE – Institut für Pflanzenschutzforschung, Eberswalde (Dr G. Schliephake); PPRI – Plant Protection Research Institute, Pretoria, South Africa (Dr E. K. Hartwig); SMF – Senckenberg Museum, Frankfurt-am-Main (Dr R. Zur Strassen); TNA – Professor T. N. Ananthakrishnan, Loyola College, Madras, India; USNM – United States National Museum of Natural History, Washington D.C., U.S.A. (Kellie O'Neill).

Systematic section

Checklist of the subtribe Williamsiellina

NANOTHRIPS Faure gen. rev.

Bagnalliola Priesner syn. n.

Nanimothrips Zur Strassen syn. n.

bicolor (Watson & Preer) comb. n.

boltoni sp. n.

breviceps Faure

kibbyi sp. n.

makaronesicus (Zur Strassen) comb. n.

nigrus (Ananthakrishnan) comb. n.

parviceps Faure

terminalis (Bagnall) comb. n.

typicus Ananthakrishnan sp. rev.

PHTHIROTHRIPS Priesner

brasiliensis Priesner

brevisetis Hood

jacoti sp. n.

johanseni sp. n.

longiceps Hood

morgani Hood

nemoralis Hood

pediculus Priesner

PUEBLOTHRIPS Stannard

minuta Stannard

SOPHIKOTHRIPS Mound
malaitae Mound

SOPHIOTHRIPS Hood
comptus Hood
panamensis Hood
politus Hood
spadix Hood
squamosus Hood
verrucosus Hood

WILLIAMSIELLA Hood
bicoloripes Hood

ZAXENOTHRIPS Crawford
peculiaris Crawford
unicolor (Hood) comb. n.
vorticossus (Hood) comb. n.

Key to genera

- 1 Antennal segment III with 3 sense cones 2
- Antennal segment III with 0 or 1 or 2 sense cones (Figs 31–42) 3
- 2 Abdominal tergites with 1 pair of wing-retaining setae; forewing without duplicated cilia; antennal segment IV with 4 sense cones **SOPHIKOTHRIPS** (p. 186)
- Abdominal tergites with 2 pairs of wing-retaining setae; forewing with duplicated cilia; antennal segment IV with 3 sense cones **PUEBLOTHRIPS** (p. 186)
- 3 Antennal segment III shorter than II (Figs 37–40); epimeral sutures incomplete, usually with all pronotal setae and mesonotal setae long with apices expanded; setae *B*₁ on tergite IX usually longer than tube; posterior margin of pelta close to anterior margin of tergite II (Figs 27–29) **PHTHIOTHRIPS** (p. 181)
- Antennal segment III usually longer than II; epimeral sutures complete, if incomplete then pelta widely separated from tergite II; usually with anterior setae on pronotum short, mesonotal midlateral setae short; setae *B*₁ on tergite IX usually shorter than tube; pelta variable 4
- 4 Pelta reduced, posterior margin not close to tergite II (Figs 25, 26) 5
- Posterior margin of pelta close to anterior margin of tergite II (including *N. parviceps* in which the pelta is divided into two sclerites) (Figs 15–24) 6
- 5 Antennal segments VII and VIII fused, III with no sense cones (Fig. 36); eyes with about 8 facets (Fig. 14); interocellar setae minute; fore tarsus without a tooth in either sex; pronotal anteromarginal, anteroangular and midlateral setae minute, epimeral setae exceptionally long; epimeral sutures not complete; setae *B*₁ on tergite IX longer than tube **WILLIAMSIELLA** (p. 189)
- Antennal segments VII and VIII separated by a suture, III with 1 sense cone (Fig. 35); eyes with about 20 facets (Figs 10, 11); fore tarsal tooth of ♀ present or absent; interocellar, and anterior pronotal setae small but stout; epimeral sutures complete; setae *B*₁ on tergite IX shorter than tube **ZAXENOTHRIPS** (p. 190)
- 6 Antennal segment III with 0 or 1 sense cone (Figs 31–34) **NANOTHRIPS** (p. 175)
- Antennal segment III with 2 sense cones (Figs 41, 42) **SOPHIOTHRIPS** (p. 186)

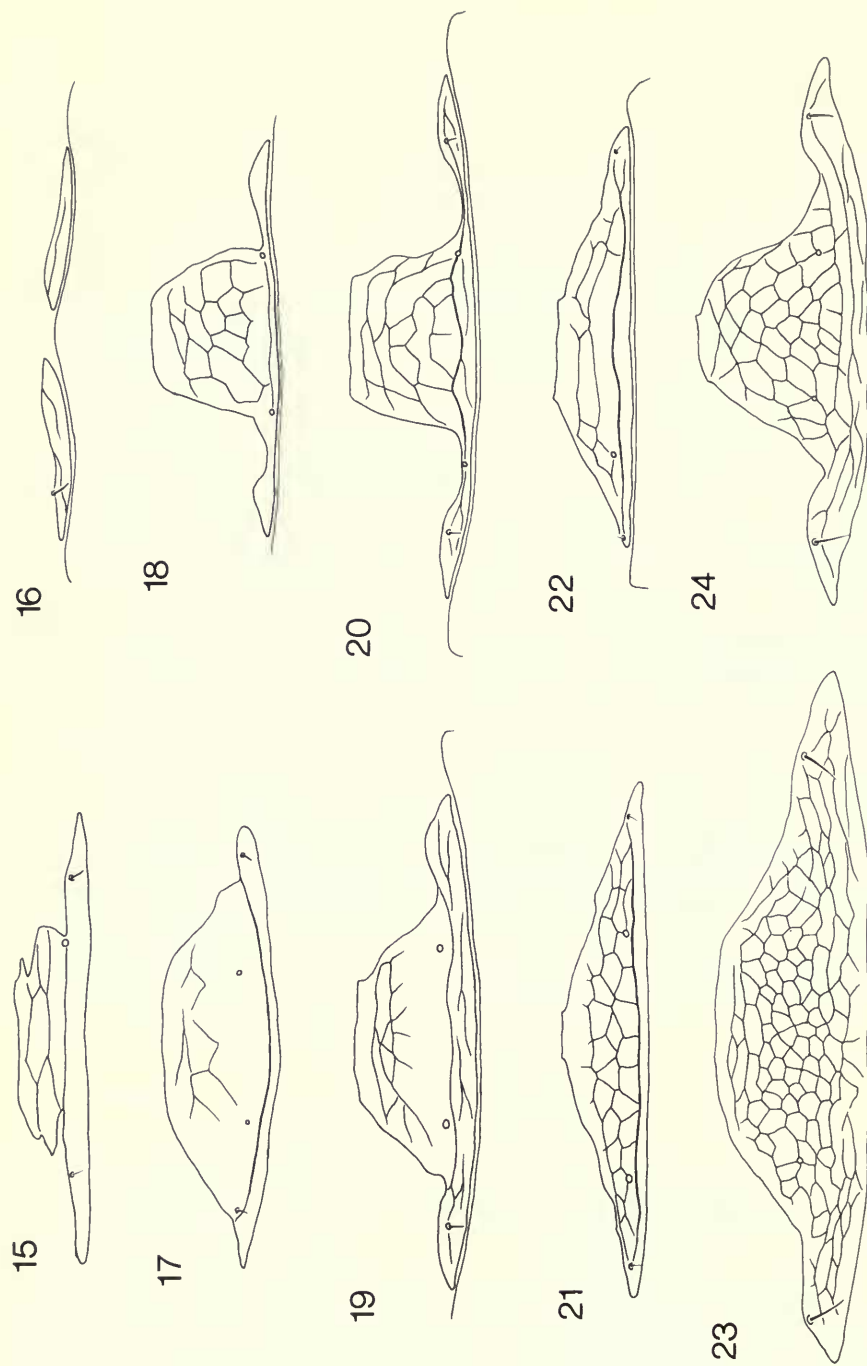
NANOTHRIPS Faure gen. rev.

Nanothrips Faure, 1938 : 3. Type-species: *Nanothrips breviceps* Faure, by original designation and monotypy.

Bagnalliola Priesner, 1949 : 95. Type-species: *Brachythrips terminalis* Bagnall, by original designation and monotypy. Syn. n.

Nanimothrips Zur Strassen, 1974 : 120–123. Type-species: *Nanimothrips makaronesicus* Zur Strassen, by original designation and monotypy. Syn. n.

Bagnalliola can be distinguished from *Nanothrips* by the lack of a sense cone on the third antennal segment. This is not accepted here as warranting a generic difference, particularly in view of the variation in number of sense cones in the genus *Phthiothrips*. The type-species of *Bagnalliola* also has the pterothoracic furca slightly less well developed than in the other species treated here in *Nanothrips*, and the median length of tergites three and four is less than in all the species apart from *nigrus* and *parviceps*. Moreover the relative lengths of the postocular setae are different in both *terminalis* and *parviceps* from the other members of *Nanothrips*. The type-species of *Nanimothrips* is unusual in that the female lacks a fore tarsal tooth, but most of the other characteristics



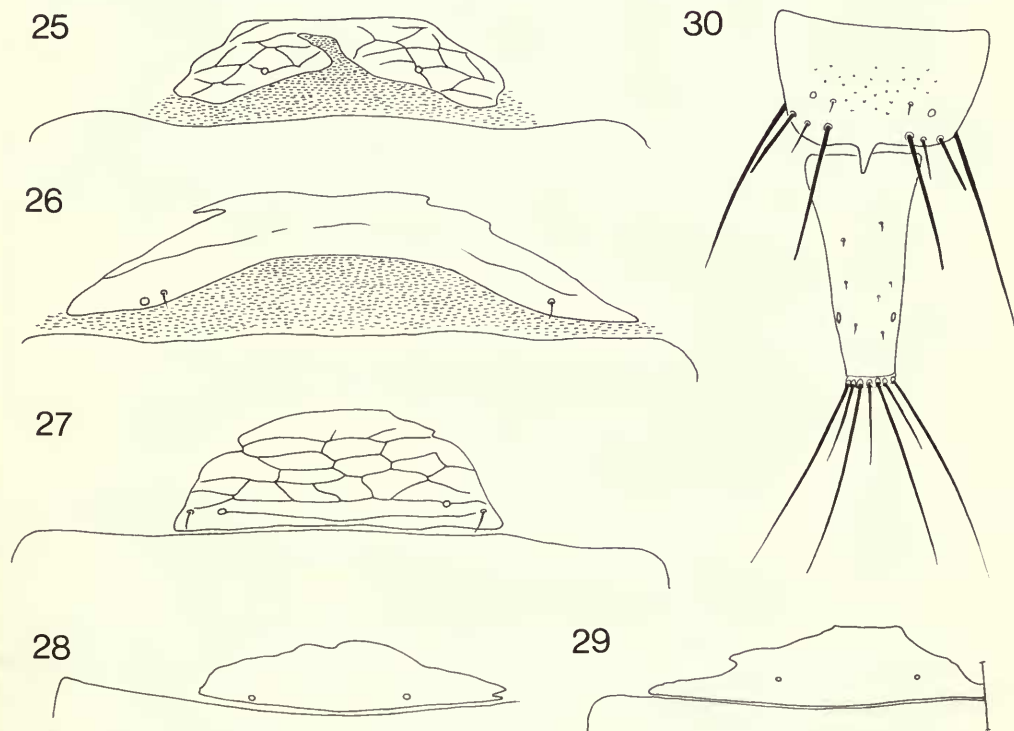
Figs 15-24 Abdominal tergite I (pelta) of Williamsiellina species. (15) *Nanolhrrips terminalis*; (16) *N. breviceps* ♀ aptera; (18) *N. breviceps* ♀ macroptera; (19) *N. kibbyi* ♀ aptera; (20) *N. kibbyi* ♀ macroptera; (21) *N. makaronesicus* ♀ aptera; (22) *N. boltoni* ♀; (23) *Sophiolhrrips spadix* ♂ aptera; (24) *S. spadix* ♀ macroptera.

used to distinguish this genus are related to the greater reduction of the pterothorax. If *makaronesicus* is placed in a separate genus then *parviceps*, *terminalis* and *bicolor* must also be segregated to their own genera. At present there seems little advantage in recognizing such a series of monobasic genera in this group, and the present interpretation has the advantage of associating all the Old World species (plus *bicolor*) in *Nanothrips* and the New World species in *Sophiothrips* and *Zaxenothrips*.

Apterous or macropterous; head small with stylets restricted to mouth cone; one pair of ocellar setae well developed; major postocular setae usually lateral in position. Antennae 8-segmented, VII and VIII closely joined, VI enlarged and longer than VII + VIII. Pronotal setae short; epimeral sutures complete; praepectus and mesopraesternum present or absent; foretarsal tooth usually present. Pterothorax usually greatly reduced; forewings, when present, parallel-sided without duplicated cilia, subbasal setae with B_2 arising posterior to B_1 . Mid and hind femora each with one large dorsal seta, tibiae with one long, external, subapical seta. Pelta variable; tergites III–VII with 1 pair of wing-retaining setae in macropterae; setae on tergite IX shorter than tube; tube short; ♂ frequently with median tubercle on posterior margin of tergite IX; ♂ without sternal glandular areas.

Key to species

- | | | |
|---|---|----------------------------|
| 1 | Pelta divided into two small sclerites (Fig. 16); eyes with less than 10 facets (Fig. 3); ♂ with a median tubercle on tergite IX [South Africa] | <i>parviceps</i> (p. 180) |
| – | Pelta entire, not divided into two; eyes with more than 20 facets; ♂ with or without a tubercle on tergite IX | 2 |
| 2 | Antennal segment III without any sense cone (Fig. 31) [France]. | <i>terminalis</i> (p. 181) |
| – | Antennal segment III with 1 sense cone (Figs 32–34) | 3 |
| 3 | Abdominal segments II–V yellow in contrast to brown of thorax | 4 |



Figs 25–30 Abdominal tergite I (pelta) and tergites IX–X of Williamsiellina species. (25) *Zaxenothrips peculiaris*; (26) *Williamsiella bicoloripes*; (27) *Phthirothrips jacoti* ♀ aptera; (28) *P. johanseni*; (29) *P. pediculus* (specimen partly rotated); (30) *Nanothrips kibbyi* ♂.

- Abdominal segments II-V brown, similar in colour to thorax 6
- 4 Intercellar, postocular, metanotal and femoral dorsal setae all with apices broadly expanded (Fig. 4); ♂ without a tubercle on posterior margin of tergite IX [U.S.A.: Florida, Texas] *bicolor* (p. 178)
- Major setae blunt or acute at apex, never broadly expanded; ♂ with a tubercle on posterior margin of tergite IX 5
- 5 Hind femora yellow; abdominal segments II-IX yellow with brown markings laterally; apterous ♀ with tube length 1.9 times basal width; tubercle on tergite IX of male scarcely 10 µm long [South-east Africa] *breviceps* (p. 179)
- Hind femora brown in basal half, yellow distally; all tibiae yellow with a brown patch medially; abdomen yellow but posterior margin of VIII and anterior margin of IX brown; apterous ♀ with tube length 1.6 times basal width; tubercle on tergite IX of ♂ 20 µm long [India] *typicus* (p. 181)
- 6 Head yellow, in contrast to brown pronotum, occipital ridge brown; tergite IX yellow 7
- Head as brown as pronotum; tergite IX brown or light brown 8
- 7 Fore tarsal tooth absent in ♀, present in ♂; pelta strongly reticulate (Fig. 21), also metanotum and tergite II; four minor postocular setae separated from each other by more than the diameter of two eye facets [Azores] *makaronesicus* (p. 180)
- Fore tarsal tooth present in both sexes; pelta scarcely reticulate (Fig. 22), metanotum and tergite II weakly reticulate; four minor postocular setae separated from each other by diameter of one eye facet (Fig. 6) [Java] *boltoni* (p. 178)
- 8 Antennal segments III-V bicoloured, brown with pedicel yellow; tibiae dark brown; tube stout, with sculpture of longitudinal ridges and reticulation; tergite IX setae *B*₁ acute at apex, more than 0.5 times as long as tube; ♂ without a median tubercle on tergite IX [India] *nigrus* (p. 180)
- Antennal segments III-V yellow, sometimes weakly shaded in apical half; tibiae yellow; tube slender without sculpture; tergite IX setae *B*₁ blunt at apex, less than 0.5 times as long as tube; ♂ with a median tubercle on tergite IX (Fig. 30) [Seychelles] *kibhiyi* (p. 179)

Nanothrips bicolor (Watson & Preer) **comb. n.**

(Fig. 4)

Sophiothrips bicolor Watson & Preer, 1939 : 1-3. Holotype ♀, U.S.A.: Florida (FSAC) [not examined].

This is the only species of *Nanothrips* from the New World. It is rather similar to species of *Phthirotithrips*. The female has parallel cheeks and the male slightly concave cheeks. The major setae, including the metanotal setae, all have widely expanded apices.

MATERIAL STUDIED. U.S.A.: Florida, Alachua City, 1 ♀, 1 ♂ paratypes in Spanish moss, 26.ix.1938 (USNM); Texas, Palacios, 2 ♀ in Spanish moss, 23.iv.1939, 1 ♂ on dead branch, 11.i.1939, 1 ♂ on dead grass, 25.iii.1939 (*Hood*) (USNM; AMG).

Nanothrips boltoni sp. n.

(Figs 6, 22, 34)

♀ aptera. Colour mainly brown, head yellow with occipital ridge brown, tergite IX yellow, tube reddish yellow; antennal segments I-II yellow, III-VI yellow with brown apices; tarsi yellow, fore tibiae yellow with a brown spot medially, fore femora yellow in distal half, mid and hind femora and tibiae with pale apices.

Head with 4 small setae close together on vertex, postocular and ocellar setae weakly expanded at apex (Fig. 6); antennae typical of genus, suture between VII and VIII weak dorsally, VI very large (Fig. 34). Pronotum broad, epimeral sutures complete; major setae almost cylindrical, apices weakly expanded; praepectus weak, mesopraesternum reduced to two small lateral triangles. Fore tarsus with a small tooth. Meso- and metanota very reduced, metanotum with 8 small setae. Pelta broad (Fig. 22); tergite II with several lines of sculpture medially, remaining tergites very weakly sculptured; setae *B*₁ and *B*₂ on IX weakly expanded at apex, *B*₃ acute; tube faintly reticulate.

Measurements (holotype ♀ in µm). Body length 1020. Head, length 80; width 115; postocular setae 18. Pronotum, length 135; median width 200; major setae, am 15, aa ?15, ml ?15, epim 25, pa 20. Metanotum,

median length without craspedum 50; width 210. Tergite III median length 52. Sternite III median length 58. Tergite IX setae B_1 50; B_2 50; B_3 80. Tube, length 95; maximum width 52; longest terminal setae 110. Antennal segments II–VIII length, 36, 42, 32, 35, 44, 23, 13.

♂ aptera. Colour and structure similar to ♀; fore tarsal tooth larger; tergite IX with a stout triangular median tubercle; setae B_2 on tergite IX short and stout.

Measurements (♂ paratype in μm). Body length 830. Head, length 74; width 100. Pronotum, length 125; median width 170. Tergite III median length 42. Sternite III median length 50. Tergite IX, length of median tubercle 22; seta B_1 50; seta B_2 26; B_3 110. Tube, length 80.

MATERIAL STUDIED. Holotype ♀, JAVA: Bogor Botanical Gardens, from dead twigs, 19.x.1973 (*L. A. Mound* 1127) (BMNH).

Paratype. 1 ♂, collected at same site as holotype, on dead creeper, 18.x.1973 (*L. A. Mound* 1120) (BMNH).

COMMENTS. This species is remarkably similar to *makaronesicus* but the female has a fore tarsal tooth, and setae B_2 on tergite IX of the female are as long as B_1 . The specimens were collected by the author during an expedition to south-east Asia with the ant specialist Barry Bolton.

Nanothrips breviceps Faure

(Figs 17, 18)

Nanothrips breviceps Faure, 1938 : 4–6. Holotype ♀, MOZAMBIQUE (PPRI) [examined].

Faure described this species on a single female which had lost its major postocular setae. Subsequently he described the male (1940) and added further details from other females (1946). The species from India, *typicus* Ananthakrishnan, is very similar to *breviceps* but can be distinguished by its colour and the form of the tube in all three morphs. The tibiae of the *breviceps* specimens from Mozambique and Zululand are yellow and the head is pale, but a female from Cape Province has the tibiae brown medially and the head is also brown.

MATERIAL STUDIED. Holotype ♀, MOZAMBIQUE: Magude, on native *Acacia*, 21.vii.1930 (*J. C. F.*).

MOZAMBIQUE: Lourenco Marques, 1 ♂ in fallen leaves, vii.1936 (*J. C. F.*) (PPRI). SOUTH AFRICA: Zululand, Richards Bay, 1 ♀ macroptera on dead branches, 1.vi.1943 (*J. C. F.*); Zululand, St Lucia Lake, 1 ♀ on dead branches, 5.viii.1945 (*J. C. F.*) (USNM); Cape Province, near Kasonga Bridge, 1 ♀ from dry branches, 11.vi.1961 (*Jacot-Guillarmod*) (AMG).

Nanothrips kibbyi sp. n.

(Figs 1, 2, 19, 20, 30, 33)

♀ macroptera. Colour mainly brown, tergite IX and tube brownish yellow; antennal segment I light brown, II yellow but shaded marginally, III yellow, V–VI yellow with shaded apices; femora brown; tibiae and tarsi yellow; forewing shaded medially.

Head with large eyes; antennae typical of genus, suture between VII and VIII complete (fig. 33). Pronotum not enlarged, epimeral sutures complete; major setae blunt at apex; praepectus small, mesopraesternum with two triangular sclerites. Fore tarsal claw very small. Mesonotal lateral setae small or absent. Metanotum weakly reticulate, 2 pairs of minor setae in anterior half, 1 pair of major setae in posterior third. Forewing typical of genus. Pelta with slender lateral wings; anterior tergites weakly sculptured medially, tube slender with almost straight margins; setae B_1 and B_2 on tergite IX blunt at apex.

Measurements (holotype ♀ in μm). Body length 1550. Head, length 125; width 160; postocular setae 30. Pronotum, length 140; median width 225; major setae, am 26, aa 26, ml 30, epim 50, pa 40. Forewing, length 650; distal width 65; subbasal setae 30. Tergite III median length 65. Sternite III median length 65. Tergite IX setae, B_1 60, B_2 70, B_3 115. Tube, length 125, maximum width 65. Antennal segments II–VIII length, 42, 45, 42, 45, 52, 26, 23.

♀ aptera. Colour and sculpture similar to macroptera; head with eyes reduced on ventral surface (Fig. 2); vestigial forewing 10 μm long bearing one seta sometimes present; metanotum devoid of sculpture medially, strongly transverse; pelta variable, lateral wings slender to broad; wing-retaining setae about 5 μm long.

Measurements (largest and smallest ♀ paratype apterae in μm). Body length 1750 (1250). Head, length 120 (90); median width 158 (145). Pronotum, length 165 (130); median width 250 (200). Metanotum, length excluding craspedum 65 (65); width 260 (200). Tergite III length 80 (60). Sternite III length 100 (70). Tergite IX setae B_1 55 (53); B_2 65 (63). Tube, length 115 (100); maximum width 65 (55); terminal setae 130 (130). Antennal segments III–VIII length 44, 39, 44, 52, 29, 23 (38, 35, 38, 45, 26, 20).

♂ aptera. Colour and sculpture similar to ♀; head of large ♂ with small tubercle ventrally between eyes; fore femora and fore tarsal tooth enlarged in large ♂; tergite IX with stout median tubercle, setae B_2 very short.

Measurements (largest and smallest ♂ paratypes in μm). Body length 1300 (1100). Head, length 115 (100); width 130 (125). Pronotum, length 165 (125); median width 225 (180). Tergite III median length 60 (50). Sternite III median length 76 (65). Tergite IX setae B_1 64 (60); B_2 20 (20); B_3 130 (130); median tubercle length 16 (14). Tube, length 110 (95); basal width 55 (50).

MATERIAL STUDIED. Holotype ♀ macroptera, SEYCHELLES: Mahe Botanic Gardens, in compost heap, viii.1975 (*G. Kibby*) (BMNH).

Paratypes. 3 ♀ macropterae, 32 ♀ apterae, 6 ♂ apterae, collected with holotype (BMNH).

COMMENTS. This species is similar to *makaronesicus* but differs in colour and the form of the B_2 setae on the ninth tergite. The available males are smaller than the oedymorous male of *makaronesicus* which has been studied. The female has a small but distinct fore tarsal tooth, and the metanotum of the apterae is almost devoid of sculpture medially. The species is named after Mr Geoffrey Kibby.

Nanothrips makaronesicus (Zur Strassen) **comb. n.**

(Fig. 21)

Nanimothrips makaronesicus Zur Strassen, 1974 : 123–134. Holotype ♀, AZORES (SMF) [not examined].

This species was based on a long series of apterae of both sexes collected in the Azores, Madeira and Canary Islands. Despite the lack of a fore tarsal tooth in the female *makaronesicus* is very similar to *boltoni* and *kibbyi*, and in the opinion of the present author is not sufficiently distinct from *breviceps* and *typicus* to warrant a separate genus. The ventral process on the head between the eyes of large males is also found in *parviceps*, *kibbyi* and *typicus* as well as in *Zaxenothrips unicolor*. Setae B_2 on tergite IX are shorter than B_1 in the females as well as the males, unlike all other members of the genus except *terminalis*.

MATERIAL STUDIED. AZORES: Santo Mario I., 280 m, 1 ♂ paratype on dead *Picconia azorica* 23.v.1969 (*Zur Strassen*). CANARY IS.: Hierro, 630 m, 1 ♀ on dead *Pyrus communis*, 11.iv.1970 (*Zur Strassen*) (BMNH).

Nanothrips nigrus (Ananthakrishnan) **comb. n.**

Sophiothrips nigrus Ananthakrishnan, 1971 : 197. Holotype ♀, INDIA (TNA) [examined].

This is a dark robust species with a relatively long head and stout tube, and with the third and fourth abdominal tergites reduced in length medially. However, the antennae as well as the rest of the body are typical of *Nanothrips*.

MATERIAL STUDIED. Holotype ♀, INDIA: [West Bengal, Darjeeling District,] Kurseong, from 'wild beat', 21.iv.1969 (*Ananthakrishnan* 451) (TNA).

INDIA: 1 ♂, same data as holotype (TNA).

Nanothrips parviceps Faure

(Figs 3, 16, 32)

Nanothrips parviceps Faure, 1946 : 7–10. Holotype ♀, SOUTH AFRICA (PPRI) [examined].

The species from India referred to as *parviceps* by Ananthakrishnan (1969) is a distinct species and is treated below under the name *typicus*. The original description of *parviceps* refers to the

division of the pelta into two sclerites (Fig. 16). Moreover the original figure indicates that the number of eye facets is greatly reduced, and that there are only 3 pairs of setae (not 4) on the head behind the eyes (Fig. 3). These characters suggest that *parviceps* could be placed in a separate monobasic genus, but the structure of the antennae (Fig. 32) is so typical of *Nanothrips* that such action seems unnecessary.

MATERIAL STUDIED. Holotype ♀, SOUTH AFRICA: Zululand, Richards Bay, from dead branches, 1.vi.1943 (*J. C. F.*) (PPRI).

SOUTH AFRICA: 1 ♀, 2 ♂, same data as holotype (PPRI).

Nanothrips terminalis (Bagnall) **comb. n.**

(Figs 5, 15, 31)

Brachythrips terminalis Bagnall, 1927 : 571–573. Holotype ♀, FRANCE (BMNH) [examined].

This species differs from the other members of *Nanothrips* in lacking a sense cone on the third antennal segment, in having the second instead of the third pair of postocular setae elongate, and in having the median length of tergites three and four reduced. However, the general appearance of *terminalis* is very similar to that of the other *Nanothrips* species and there seems little point in dividing these into smaller genera.

MATERIAL STUDIED. Holotype ♀, FRANCE: Tamaris, from *Erica arborea*, iii.1927 (*Bagnall*) (BMNH).

FRANCE: Montpellier, 2 ♀, 2 ♂ on dead branches of *Quercus* and *Tamarix*, 1957–1959 (*Bournier*) (BMNH & USNM).

Nanothrips typicus Ananthakrishnan **sp. rev.**

Nanothrips typicus Ananthakrishnan, 1964 : 120. LECTOTYPE ♂, INDIA (TNA), here designated [examined].

Ananthakrishnan (1969) placed this species as a synonym of *parviceps*, although it seems likely that this was a lapsus for *breviceps*. However, the Indian and African species can be distinguished by means of the key above. The males have a small process on the ventral surface of the head between the eyes as in *kibbyi* and *parviceps*, but this is not as large as in *makaronesicus*. The forewing of the macropterae is shaded at the extreme base and also medially.

MATERIAL STUDIED. Lectotype ♂, INDIA: Madras, on *Sesbania* bark, 18.v.1963 (TNA).

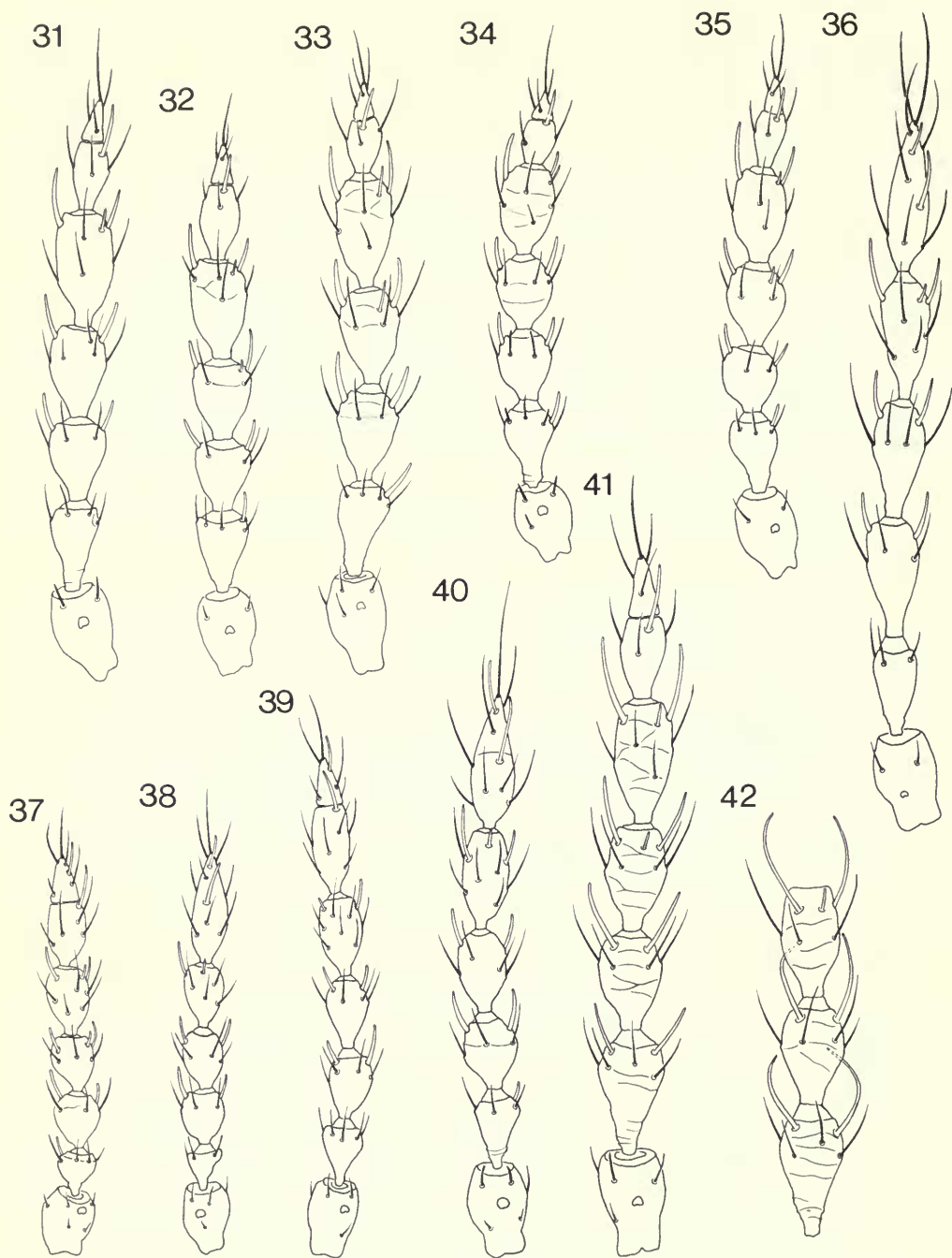
INDIA: 6 ♀, 2 ♀ mac., 2 ♂ from dead twigs, 1966–1969 (BMNH; SMF; TNA).

PHTHIROTHRIPS Priesner

Phthirotithrips Priesner, 1933 : 154. Type-species: *Phthirotithrips pediculus* Priesner, by original designation and monotypy.

Eight species are recognized in this genus, two from Africa and six from the New World. The species are amongst the smallest in the Tubulifera which may account for the rarity of their collection. J. D. Hood studied large collections of Thysanoptera from dead wood and leaf litter in Brazil and Panama, but apparently only found the genus on three or four occasions. Similarly the present author has studied many collections from Trinidad without finding any *Phthirotithrips*. The species are probably associated with fungal hyphae or lichens rather than mosses. Almost all the available specimens are apterous, although *brasiliensis* was described from a single macroptera, and the new species *jacoti* described below from Angola is known from winged and wingless individuals. The genus appears to be a valid member of the Williamsiellina.

Small species, usually apterous with head smaller than pronotum; maxillary stylets confined to mouth cone. Antennae 7- or 8-segmented, III exceptionally short; sense cone formula variable III-0, IV-2 (*morgani*, *johanseni*, *brasiliensis*); III-1, IV-2 (*pediculus*, *nemoralis*, *longiceps*, *jacoti*); III-2, IV-3 (*brevisetis*).



Figs 31–42 Right antennae of Williamsiellina species. (31) *Nanothrips terminalis*; (32) *N. parviceps*; (33) *N. kibbyi*; (34) *N. boltoni*; (35) *Zaxenothrips unicolor*; (36) *Williamsiella bicoloripes*; (37) *Phthirotirps pediculus* (partly rotated); (38) *P. morgani*; (39) *P. johanseni* (left antenna); (40) *P. jacoti* ♀ aptera; (41) *Sophiothrips spadix* ♂ aptera; (42) *S. spadix* ♀ macroptera (segments III–V).

Pronotum with epimeral sutures incomplete, praepectus and mesopraesternum weak or absent; major setae usually well developed. Pelta usually transverse and unsculptured; abdomen broader than thorax, median tergites usually not reduced in length medially; setae on tergite IX acute, usually longer than tube. Macroptera with forewing broad, without duplicated cilia, subbasal setae arising in a straight row.

Key to species (excluding *brasiliensis* Priesner)

- 1 Antennal segment III with 2 sense cones, IV with 3 sense cones; pronotal anteroangular and anteromarginal setae less than $5\text{ }\mu\text{m}$ long, also mesonotal lateral setae; sternite VIII of ♂ with a small circular glandular area [Brazil] *brevisetis* (p. 183)
- Antennal segment III with 0 or 1 sense cone, IV with 2 sense cones (Figs 37–40); pronotal setae at least $20\text{ }\mu\text{m}$ long; sternite VIII of ♂, where known, with narrow transverse glandular area 2
- 2 Postocular setae, pronotal major setae and mesonotal lateral setae all slender and finely acute at apex [Mexico] *johanseni* (p. 184)
- Major setae of head and thorax with apices expanded or bluntly rounded 3
- 3 Pelta strongly reticulate, rectangular, occupying about 0.4 of anterior margin of tergite II (Fig. 27); tergite IX setae B_1 less than 0.8 times as long as tube; ♀ aptera with lateral margins of tube convex [Angola] *jacoti* (p. 184)
- Pelta usually without sculpture, transverse, occupying more than 0.8 of anterior margin of tergite II (Figs 28, 29); tergite IX setae B_1 longer than tube 4
- 4 Fore tarsal tooth absent; antennal segment II yellow in contrast to brown of segments III–VIII; suture between VII and VIII complete (Fig. 37) [Liberia] *pediculus* (p. 185)
- Fore tarsal tooth present, small at apex of tarsus; antennal segment II yellow brown to brown; suture between antennal segments VII and VIII absent or incomplete ventrally 5
- 5 Antennal segment III exceptionally small, without a sense cone (Fig. 38) [eastern U.S.A.] *morgani* (p. 185)
- Antennal segment III with one sense cone 6
- 6 Antennal segments VII and VIII with a suture indicated dorsally, total length of these segments 1.6 times as long as segment VI (Brazil) *longiceps* (p. 185)
- Antennal segments VII and VIII without any suture, total length 1.2 times as long as VI (Brazil) *nemoralis* (p. 185)

Phthirothrips brasiliensis Priesner

Phthirothrips brasiliensis Priesner, 1937 : 347–348. Holotype ♀, BRAZIL (IPE) [examined].

The unique holotype is a macropterous female with no sense cones on the third antennal segment. The fore tarsus bears a very small apical tooth as in *morgani*, and the pelta is similar to that of *morgani* and *pediculus* (Fig. 29) but a little more triangular. However, the suture between antennal segments seven and eight is complete. Since it is unlikely that a macropterous individual would have fewer sense cones than an aptera of the same species, *brasiliensis* can only be compared to *morgani*, and it may well eventually prove to be the undescribed macropterous form of that species.

Phthirothrips brevisetis Hood

Phthirothrips brevisetis Hood, 1950 : 28–30. Holotype ♀, BRAZIL (USNM) [examined].

This species is unusual in the genus in several respects: antennal segment III not exceptionally small; segments III and IV both with one extra sense cone; anterior pronotal and mesonotal lateral setae exceptionally short; epimeral sutures almost complete in some individuals; fore tarsal tooth absent in ♂ and ♀; sternite VIII of ♂ with glandular area circular.

MATERIAL STUDIED. Holotype ♀, BRAZIL: Estado de Rio de Janeiro, Petropolis, on dead branch, 27.v.1948 (Hood) (USNM).

BRAZIL: 21 ♀, 7 ♂ paratypes collected with the holotype or at Boracea, Estado de São Paulo (USNM; 1 ♀ BMNH).

Phthirothrips jacoti sp. n.

(Figs 13, 27, 40)

Apterous ♀. Colour brown, posterior abdominal segments and tube darkest; antennal segments I–IV light brown; major setae dark except at posterior end of abdomen.

Head with cheeks swollen behind eyes (Fig. 13), postocular setae with expanded apices; maxillary stylets visible just anterior to postoccipital ridge. Antennae 7-segmented, suture between VII and VIII faintly and variably indicated on dorsal surface only, III with 1 sense cone, IV and V each with 2 sense cones (Fig. 40). Pronotum with a few lines of sculpture near posterior margin; epimeral sutures not complete; anterior two pairs of setae short and blunt, remaining setae with apices expanded; praepectus and mesopraesternum weakly developed; fore tarsus without a tooth. Mesonotum without a lateral seta. Pelta rectangular to semicircular, surface reticulate (Fig. 27); tergites III–V shorter medially than sternites, lateral setae stout with apices expanded; tergite IX setae finely acute; tube stout with tapering, convex margins.

Measurements (holotype ♀ in μm). Body length 1600. Head, length 130; width 145; postocular setae 50. Pronotum, length 130; width 195; major setae, μm 13, aa 13, ml 40, epim 50, pa 50. Tergite III length 80. Sternite III length 110. Tergite IX setae, B_1 95; B_2 85; B_3 85. Tube, length 115; maximum width 76; apical width 26; terminal setae 55. Antennal segments II–(VII + VIII); length 38, 35, 32, 38, 50, 65.

Macropterous ♀. Colour similar to aptera, wings brown. Head with ocelli, compound eyes larger than aptera; mesonotal lateral setae with apices expanded; forewing parallel-sided, without duplicated cilia, subbasal setae arising in a straight line; tergites III–VII with 1 pair of wing-retaining setae.

Measurements (♀ paratype macroptera in μm). Body length 1500. Head, length 130; width 145; postocular setae 40. Pronotum, length 110; epimeral setae 50. Forewing, length 650; distal width 64; subbasal setae 39, 53, 50. Tergite III length 65. Sternite III length 100. Tergite IX setae B_1 85, B_2 100, B_3 85. Tube, length 130; maximum width 70; apical width 26; terminal setae 65. Antennal segments II–(VII + VIII) length, 38, 32, 32, 38, 50, 70.

Apterous ♂. Colour a little paler than ♀, basal antennal segments almost yellow; structure similar to apterous ♀; sternite VIII with a narrow median transverse glandular area; tergite IX with setae B_2 variable, sometimes shorter than B_1 .

Measurements (♂ paratype in μm). Body length, 1200. Head, length 125; width 125. Pronotum length, 125; width 165; epimeral setae 58. Tergite III length 65. Sternite III length 100. Tergite IX setae B_1 80. Tube, length 100.

MATERIAL STUDIED. Holotype ♀ aptera, ANGOLA: 30 km north of Vila Luso, 20° 00' E, 11° 00' S, in hardwood forest litter, i.1949 (*Machado*) (USNM – Hood No. 1486).

Paratypes. ANGOLA: 12 ♀ apterae, 4 ♀ macropterae, 7 ♂ apterae collected with holotype (USNM; BMNH; AMG; Prof. A. Bournier Collection, Montpellier).

COMMENTS. This species is considerably larger than the other species in the genus. The pterothorax and pelta of the apterae are less transverse and reduced than in the other species, and the setae on the ninth tergite are shorter than the tube. The relatively broad head and tube, and the reduction in length of the median tergites are also unusual. This species is named in honour of the South African Thysanoptera specialist Mr C. Jacot-Guillarmod.

Phthirothrips johanseni sp. n.

(Figs 28, 39)

Apterous ♀. Colour medium brown, pedicel of antennal segment III yellow. Head similar in shape to *morgani*, with no sculpture dorsally except one faint line close to post occipital ridge; postocular setae finely acute. Antennae 8-segmented, with a complete suture between VII and VIII; III with 0 sense cone, IV and V with 2 sense cones (Fig. 39). Pronotum similar to *morgani*, epimeral sutures incomplete but major setae long and acute; praepectus well developed, mesopraesternum absent. Fore tarsal tooth present but small; meso- and metanota, also pelta and rest of tergites devoid of sculpture; tergal setae all finely acute; tube typical of genus, short and conical.

Measurements (holotype ♀ in μm). Body length 1250. Head, length 100; width ?80; postocular setae 80. Pronotum, length 115; median width ?150; major setae, am 30, aa 25, ml 52, epim 100, pa 50. Mesonotal lateral seta 32. Tergite IX setae, B_1 165; B_2 165; B_3 130. Tube, length 80, basal width 55; terminal setae, 95. Antennal segments II–VIII length, 35, 29, 32, 32, 38, 45, 23.

MATERIAL STUDIED. Holotype ♀, MEXICO: Nogales, taken in quarantine from orchid debris, 9.v.1966 (*C. H. Spitzen*) (USNM).

COMMENTS. The unique holotype of this species is mounted slightly laterally. It is similar in general appearance to *morgani* but has a complete suture between the seventh and eighth antennal segments, and all the major setae are exceptionally long with finely acute apices. The species is named in honour of the Mexican Thysanoptera specialist Dr R. M. Johansen.

Phthirotrips longiceps Hood

Phthirotrips longiceps Hood, 1960 : 59–61. Holotype ♀, BRAZIL (USNM) [examined].

This species is very similar to *morgani* but is slightly larger with a sense cone on the third antennal segment.

MATERIAL STUDIED. Holotype ♀, BRAZIL: Santa Catarina Province, Nova Teutonia, in leaf litter, v.1957 (*Plaumann*) (USNM).

BRAZIL: 15 ♀, 10 ♂ paratypes with same data as holotype (USNM).

Phthirotrips morgani Hood

(Figs 12, 38)

Phthirotrips morgani Hood, 1941 : 206–208. Holotype ♀, U.S.A.: Florida (USNM) [examined].

Eulissotrips antennatus Morgan in Hood, 1941 : 208. [Nomen nudum.]

This species is very similar to *longiceps* and *nemoralis*. All of the available specimens of *morgani* are very small, with a minute fore tarsal tooth and the third antennal segment exceptionally short and lacking a sense cone. The suture between segments VII and VIII is usually not developed at all but is sometimes indicated by a faint dorsal line. Until further collections are made it will not be possible to determine the significance of the small differences between these species which might represent geographic variation in one widespread species. As is discussed above, *brasiliensis* may eventually prove to be the macropterous form of *morgani*.

MATERIAL STUDIED. Holotype ♀, U.S.A.: Florida, Gainesville, from reindeer moss, 19.iii.1933 (*Watson*) (USNM).

U.S.A.: Florida, Alachua City, Sugar Foot Hammock, ♂ paratype from dead leaves on ground, 5.ii.1939 (*Watson*) (USNM); 2 ♀, 2 ♂ with similar data, 1926–1933 (*Watson*) (BMNH); 4 ♀, 4 ♂ from moss, Gainesville, vii–viii.1954 (*Hood*) (USNM). MEXICO: Vera Cruz (collected in quarantine at Laredo, Texas), 1 ♀, 1.xii.1958 (USNM).

Phthirotrips nemoralis Hood

Phthirotrips nemoralis Hood, 1954b : 25. Holotype ♀, BRAZIL (USNM) [examined].

The only known specimen of this species is very similar to *morgani* but with a sense cone on the third antennal segment. Both *morgani* and *longiceps* have the combined length of antennal segments VII and VIII 1.6 times as long as the length of segment VI.

MATERIAL STUDIED. Holotype ♀, BRAZIL: Para State, Belem, from dead leaf, 11.viii.1951 (*Hood*) (USNM).

Phthirotrips pediculus Priesner

(Figs 29, 37)

Phthirotrips pediculus Priesner, 1933 : 154–156. Syntypes of both sexes, LIBERIA (SMF; USNM; BMNH) [2 ♀ examined].

The original figure of this species is misleading. The first abdominal tergite is not complete and

bearing two pairs of setae, it is reduced to a transversely elongate and unsculptured pelta (Fig. 29). Moreover the third antennal segment bears 1 sense cone and the fourth and fifth segments each bear 2 sense cones (or $1 + 1^{+1}$). This species differs from *morgani*, *longiceps* and *nemoralis* most obviously in the complete suture between the seventh and eighth antennal segments.

MATERIAL STUDIED. LIBERIA: 2 ♀ syntypes (labelled paratypes), 'aus Mulm u. Moos' (BMNH; USNM).

PUEBLOTHRIPS Stannard

Pueblothrips Stannard, 1950 : 143–145. Type-species: *Pueblothrips minuta* Stannard, by original designation and monotypy.

Priesner (1960) included this genus in the Williamsiellina on the grounds that the maxillary stylets are restricted to the mouth cone and the tube is short. However, the median abdominal tergites each bear 2 pairs of wing-retaining setae, the forewings have about four duplicated cilia, and the third antennal segment bears 3 sense cones. These characteristics suggest that *Pueblothrips* is not related to the other genera in this subtribe, but no alternative relationship can be suggested at present.

Pueblothrips minuta Stannard

Pueblothrips minuta Stannard, 1950 : 145–146. Holotype ♂, MEXICO (INHS) [not examined].

This species, which is the only species in the genus, was apparently collected from ground litter.

MATERIAL STUDIED. MEXICO: Hueytamalco, Puebla, 1 ♀ paratype, 30.xii.1945 (*Alvarez*) (USNM). U.S.A.: Florida, taken in quarantine at Brownsville, 1 ♂ on orchid flower, 17.v.1937 (*Singleton*) (USNM).

SOPHIKOTHRIPS Mound

Sophikothrips Mound, 1970 : 113–114. Type-species: *Sophikothrips malaitae* Mound, by original designation and monotypy.

The only species in this genus is known from a single macropterous female collected in the Solomon Islands. This specimen bears a superficial similarity to members of the *Sophiothrips* group in having a small head, broad pronotum and a small tube. Moreover the forewings have no duplicated cilia and the median abdominal tergites only bear one pair of wing-retaining setae. However, the maxillary stylets appear to be longer than in any other member of the Williamsiellina, and the antennal sense cone formula (3 on III; 4 on IV) is not found in other species in this group.

Sophikothrips malaitae Mound

Sophikothrips malaitae Mound, 1970 : 114. Holotype ♀, SOLOMON ISLANDS (BMNH) [examined].

MATERIAL STUDIED. Holotype ♀ macroptera, SOLOMON ISLANDS: Malaita, in leaf litter, 24.i.1965 (*Greenslade*) (BMNH).

SOPHIOTHRIPS Hood

Sophiothrips Hood, 1933 : 425–426. Type-species: *Sophiothrips squamosus* Hood, by original designation.

This genus is exceptionally difficult to understand at present, partly because of the magnitude of the intraspecific variation between sexes and morphs and partly because of the lack of material on which to base a knowledge of interspecific variation. It must be stressed that the key to species given below applies only to the type-series of the six species. In the Hood collection at the USNM there are a further 3 ♂, 14 ♀ of doubtful identity which are intermediate between several of the nominal species. These specimens may represent further undescribed species, or, particularly as

they were collected with one or more of the described species, they may indicate that some of the nominal species are synonyms.

Unfortunately several species are known only from one or two morphs, or even from one sex. The shape of the head (Figs 7–9) and the colour of the legs is usually different between the sexes, but the unique holotype of *comptus*, a macropterous female, is very 'masculine' in appearance. In *politus* the terminal setae on tergite IX are shorter than the tube in the female but longer than the tube in the male. Moreover the metanotal setae are elongate in the male. Similarly the praepectus is usually present in males and absent in females, but this structure is present in the females of *panamensis*. The body surface is strongly sculptured in *squamosus* and *verrucosus* but is almost smooth in *panamensis*. However, in *spadix* the micropterae have no sculpture on the fore femora whereas the macropterae are weakly sculptured. All the morphs of each of the species in the genus have 2 sense cones on segments III and IV, but in macropterae these are long and curved whereas in micropterae they are short and straight. The macropterae have only 1 pair of tergal wing-retaining setae, and the wing lobes of the female micropterae are very small, each bearing one or two setae. The median abdominal sternites are considerably longer than the tergites and none of the males has a sternal glandular area. In *spadix* the male has a stout tubercle medially on the posterior margin of tergite IX, and the male of *verrucosus* has a small lobe in this position. However, the males of *politus* and *squamosus* lack all trace of this structure.

Key to species

- 1 Antennal segment II dark brown, at least at base; fore femora strongly sculptured 2
- Antennal segment II yellow to yellowish brown; fore femora usually without sculpture, sometimes weakly sculptured in ♀ macropterae 4
- 2 Tube brown; interocellar and lateral postocular setae short, scarcely twice as long as diameter of one eye facet; only ♀ apterae known [Brazil] *verrucosus* (p. 189)
- Tube yellow or golden brown with apical constricted band dark brown; interocellar setae 3–5 times as long as diameter of one eye facet 3
- 3 Antennal segments III–VIII dark brown, extreme base of III and IV yellow; interocellar setae exceptionally long (62 µm); hind femora, tibiae and tarsi brown [Brazil] *comptus* (p. 187)
- Antennal segments III–VI bicoloured, III yellow at apex as well as extreme base; interocellar setae about 20 µm; hind femora yellow at apex, tibiae brown, tarsi pale [Panama] *squamosus* (p. 188)
- 4 Median area of metanotum not sculptured [♂ unknown] [Panama] *panamensis* (p. 187)
- Median area of metanotum sculptured 5
- 5 Macropterous ♀ with tube yellow medially, brown at base and apex; ♂ with median tubercle on posterior margin of tergite IX [U.S.A.: Florida] *spadix* (p. 188)
- Macropterous ♀ with tube golden yellow basally, apical sixth dark brown; ♂ without a tubercle on tergite IX [Brazil] *politus* (p. 188)

Sophiothrips comptus Hood

Sophiothrips comptus Hood, 1956 : 69–72, fig. 154. Holotype ♀, BRAZIL (USNM) [examined].

The unique holotype of this species is exceptionally large and brightly coloured. The cheeks are strongly swollen, as is typical of males in this genus, but the postocular setae are scarcely one-third as long as the postocellar setae.

MATERIAL STUDIED. Holotype ♀ macroptera, BRAZIL: Santa Catarina State, Nova Teutonia, ii.1950 (*Plaumann*) (USNM).

Sophiothrips panamensis Hood

Sophiothrips panamensis Hood, 1933 : 428–429. Holotype ♀, PANAMA (USNM) [examined].

This species is known from three females which appear to have been collected together with *S. squamosus*. These females are particularly lacking in sculpture.

MATERIAL STUDIED. Holotype ♀ macroptera, PANAMA: Porto Bello, from dead vegetation, 10.vii.1933 (Hood) (USNM).

PANAMA: 1 ♀ macroptera, 1 ♀ microptera paratypes with same data as holotype (USNM).

Sophiothrips politus Hood

Sophiothrips politus Hood, 1956 : 72–75, fig. 155. Holotype ♀, BRAZIL (USNM) [examined].

This relatively weakly sculptured species was described from three females and one male collected at Belem and one female collected in Georgetown, Guyana. However, there is one macropterous female from Trinidad in Hood's collection which has the colour and lack of sculpture of *politus* but has a heavy looking tube as occurs in *squamosus*. Moreover there is also one macropterous female which was collected with the *politus* type-series and generally looks like that species, but has the pronotum and fore femora sculptured as in *squamosus* and has antennal segments III–VI dark brown not bicoloured. These specimens either represent two further species or they may indicate that the sculpture and body colour are variable in some species of this genus.

MATERIAL STUDIED. Holotype ♀ macroptera, BRAZIL: Para State, Belem, from dead *Hevea* branches, 26.vii.1951 (Hood) (USNM).

BRAZIL: 1 ♀ macroptera, 1 ♂ microptera paratypes with same data as holotype; 1 ♀ macroptera with similar data but 4.viii.1951 (USNM).

Sophiothrips spadix Hood

(Figs 7–9, 23, 24, 41, 42)

Sophiothrips spadix Hood, 1954a : 282–283. Holotype ♀, U.S.A.: Florida (USNM) [examined].

The differences between the morphs are very considerable in this species. The antennae of the macropterae are similar to those of *comptus* and *squamosus*, but the sense cones on the micropterae are much shorter (Figs 41, 42). The head of the macropterae is similar to that of *politus* although more constricted to the base, but the head of the male is elongate with long setae. In Hood's collection there is one male from Miami, Florida, which looks like *spadix* but which lacks the tubercle on the posterior margin of the ninth tergite.

MATERIAL STUDIED. Holotype ♀ macroptera, U.S.A.: Florida, Gainesville, collected from dead oak branches, 13.vi.1954 (Hood) (USNM).

U.S.A.: 11 ♀ macropterae, 18 ♀ micropterae, 6 ♂ micropterae paratypes with same data as holotype (USNM).

Sophiothrips squamosus Hood

Sophiothrips squamosus Hood, 1933 : 426–428. Holotype ♀, PANAMA (USNM) [examined].

Sophiothrips squamosus Hood; Hood, 1950: 41, figs 67–71.

Some of the specimens in the type-series of *squamosus* bear the same Hood number (989) as the types of *panamensis*, which suggests that these species were collected together. They appear to be quite distinct from each other since *squamosus* is heavily sculptured whereas *panamensis* has very weak sculpture markings. However, one male in the Hood collection, which bears the same date and locality as the types but has the Hood number 988, is very similar to a large male *squamosus* except that the fore femora are almost unsculptured and the pronotal anteroangular setae are as long as the basal width of the head. Hood (1950) recorded *squamosus* from Cuba and Brazil, but later (1954) described the Brazilian specimens as *verrucosus*.

MATERIAL STUDIED. Holotype ♀ macroptera, PANAMA: Porto Bello, from dead vegetation, 10.vii.1933 (Hood) (USNM).

PANAMA: 1 ♀ macroptera, 3 ♀ micropterae, 4 ♂ micropterae paratypes with same data as holotype; 1 ♂ paratype with similar data except 9.vii.1933; 1 ♂ macroptera, Barro Colorado Island, 6.viii.1933 (USNM).

Sophiothrips verrucosus Hood

Sophiothrips verrucosus Hood, 1956 : 75–77, figs 156–157. Holotype ♀, BRAZIL (USNM) [examined].

This species is very similar to *squamosus* with which it was originally misidentified (Hood, 1950 : 41). However, the body colour is darker and the sculpture differs in detail. There is one female in the Hood collection from Brazil, Jacarepagua, 28.vi.1948, which is similar in colour to *verrucosus* but lacks the complex structure.

MATERIAL STUDIED. Holotype ♀ microptera, BRAZIL: Distrito Federal, Jacarepagua, from dead branches, 21.vi.1948 (Hood & Borgmeier) (USNM).

BRAZIL: 2 ♀, 1 ♂ paratypes with similar data, 9.v.1948 (USNM).

WILLIAMSIELLA Hood

Williamsiella Hood, 1925 : 60. Type-species: *Williamsiella bicoloripes* Hood, by original designation and monotypy.

Apterous; head with postocular setae elongate and arising far apart, ocellar and cheek setae very small; cheeks straight, converging to base of head; eyes with only 7 or 8 facets. Antennal segment III relatively small but slender with no sense cones, VI slender, VII and VIII fused. Prothorax with epimeral sutures exceptionally short; anteromarginal, anteroangular and midlateral setae very short, epimeral setae very long, posteroangular setae variable; praepectal plates weakly indicated by large shaded areas formed from fused chitinous islets. Fore tarsus unarmed in both sexes. Meso- and metathoracic furcae fused into an inverted U-shape with extensions to coxal cavities and a slender median spinula. Pelta arched away from tergite II; sternites III–V much longer than tergites, IV and V with 8–10 median accessory setae; tergite IX with B_1 setae longer than tube.

Williamsiella bicoloripes Hood

(Figs 14, 26, 36)

Williamsiella bicoloripes Hood, 1925 : 60–61. Holotype ♀, TRINIDAD (USNM) [examined].

This species resembles *Phthirotithrips* species in the epimeral sutures and setae on tergite IX, but has different antennae and thoracic chaetotaxy. The body colour is quite distinctive in that it is mainly brown to dark brown with antennal segment II and the distal extremities of the femora pale. The setae on tergite IX are paler and more slender than the other major setae. It is significant that this, the most widespread and common species of the Williamsiellina, should be placed in a monobasic genus. However, despite its distribution no macropterae are known. The species is usually found on dead branches where it apparently feeds on the fungal component of lichens. This is deduced from the fact that the hind gut usually contains large amounts of green pigment apparently from undigested algal cells.

MATERIAL STUDIED. Holotype ♀, TRINIDAD: Arima, Verdant Vale, beaten from faggots, 12.viii.1917 (C. B. Williams) (USNM).

TRINIDAD: 1 ♂, 1 ♀ paratypes with same data as holotype (USNM); El Tucuche, 1 ♀ on dead branches, vi.1951 (USNM); Simla, 3 ♂ on dead wood, xi.1970, and Aripo, 5 ♀, 1 ♂, 9 larvae II on *Hibiscus* branch with lichen and moss, xi.1970 (*L. A. Mound*) (BMNH). BRAZIL: São Paulo State, Boraceia, Salesopolis, 9 ♀, 1 ♂, vi.1948; Santa Catarina State, Nova Teutonia, 23 ♀, i–v.1949; Rio de Janeiro State, Petropolis, 10 ♀, v–vi.1948 (USNM). U.S.A.: Florida, Palmdale, 6 ♀, 1 ♂ on dead bracken, iii.1938; F., Torreya State Park, 7 ♀, 3 ♂ on dead branches, xii.1938; Texas; Pledger, 4 ♀, 1 ♂ on dead branches, i & iv.1939; T., Angleton, 1 ♀, iii.1939 (USNM).

ZAXENOTHRIPS Crawford

Zaxenothrips Crawford, 1943 : 221–224. Type-species: *Zaxenothrips peculiaris* Crawford, by original designation and monotypy.

Head strongly transverse except in major ♂; 3 pairs of postocular setae, median 2 pairs shorter than lateral pair. Antennae 8-segmented, VII and VIII closely joined, VI enlarged; III with 1 sense cone, IV with 2 sense cones. Pronotum transverse, except in major ♂, epimeral sutures complete; major setae not elongate; praepectus usually very small and weak, mesopraesternum absent. Pterothorax strongly transverse with mesothoracic spiracles protruding. Pelta reduced to an arch, distant from anterior margin of tergite II; tergites III and IV much shorter medially than sternites; setae on tergite IX shorter than tube, B_2 in ♀ shorter and stouter than B_1 . Tube short and stout with short terminal setae; ♂ without a median tooth on tergite IX.

The three species here included in this genus are very similar to each other. Although they were described in different genera there is a possibility that they represent variants of a single species. The antennae are very similar to those of *Nanothrips* species, but the pelta is different.

Key to species

- 1 Antennal segment II brown; segments III–VII strongly bicoloured, brown in distal half but yellow at base [U.S.A.: Maryland, Illinois] *peculiaris* (p. 190)
- Antennal segment II yellow, III–VII pale or weakly bicoloured 2
- 2 Fore tarsal tooth present in ♀; lateral postocular setae at least 20 μ m, about twice as long as diameter of one eye facet [U.S.A.: Texas, Florida] *unicolor* (p. 190)
- Fore tarsal tooth absent in ♀; lateral postocular setae 16 μ m, shorter than the diameter of one eye facet [U.S.A.: Florida] *vorticossus* (p. 190)

Zaxenothrips peculiaris Crawford

(Figs 10, 11, 25)

Zaxenothrips peculiaris Crawford, 1943 : 224–225. Holotype ♀, U.S.A.: Maryland (USNM) [examined].

The major males of this species have a longer head than the females and minor males, and the pronotum and forelegs are considerably enlarged. This species may represent a darker northern form of *unicolor*.

MATERIAL STUDIED. Holotype ♀, U.S.A.: Maryland, Bethesda, under hickory bark, 18.viii.1940 (J. C. Crawford) (USNM).

U.S.A.: 2 ♀, 1 ♂ aptera, 1 ♀ macroptera paratypes with same data as holotype (USNM with 1 ♀ BMNH); Illinois, Hardin City, 2 ♀, 1 ♂ on dead wood, 9.x.1970 (L. A. Mound) (BMNH).

Zaxenothrips unicolor (Hood) comb. n.

(Fig. 35)

Sophiothrips unicolor Hood, 1939 : 597–600. Holotype ♀, U.S.A.: Texas (USNM) [examined].

The specimens listed below from Florida have shorter postocular setae than the type-specimens from Texas.

MATERIAL STUDIED. Holotype ♀, U.S.A.: Texas, Palacios, on dead branches, 19.xii.1938 (Hood).

U.S.A.: 10 ♀, 2 ♂ paratypes with similar data, xii.1938 – iv.1939 (USNM, with 1 ♀ BMNH); Florida, Sea Horse Key, 11 ♀, 1 ♂ on dead branch, 13.vii.1954 (Hood) (USNM, with 1 ♀ AMG).

Zaxenothrips vorticossus (Hood) comb. n.

Sophiothrips vorticossus Hood, 1954a : 283–284. Holotype ♀, U.S.A.: Florida (USNM) [examined].

This species and *unicolor* differ from *Sophiothrips* species in the form of the pelta and in the shortness of the sense cones on the antennae.

MATERIAL STUDIED. Holotype ♀, U.S.A.: Florida, Homestead, on dead branches, 22.vii.1940 (USNM).

U.S.A.: 1 ♀ paratype with similar data but 6.iv.1938 (*Bradley*) (USNM).

References

- Ananthakrishnan, T. N. 1964. Thysanoptera Indica—I. *Ent. Tidskr.* **85** : 99–120.
 — 1969. Indian Thysanoptera. *Zool. Monogr. Council sci. ind. Res.* **1** : 171 pp.
 — 1971. Mycophagous Thysanoptera III. *Orient. Insects* **5** : 189–208.
 Bagnall, R. S. 1927. Contributions towards a knowledge of the European Thysanoptera II. *Ann. Mag. nat. Hist.* (9)**19** : 564–575.
 Crawford, J. C. 1943. A new genus and species of Hoplothripini (Thysanoptera: Phlaeothripidae). *Proc. ent. Soc. Wash.* **45** : 221–225.
 Faure, J. C. 1938. Descriptions of new Thysanoptera. *Publs Univ. Pretoria Ser. II, nat. Sci.* **4** : 20 pp.
 — 1940. Records and descriptions of South African Thysanoptera I. *J. ent. Soc. sth. Afr.* **3** : 159–172.
 — 1946. Records and descriptions of South African Thysanoptera IV. *J. ent. Soc. sth. Afr.* **9** : 7–13.
 Hood, J. D. 1925. New Neotropical Thysanoptera collected by C. B. Williams. *Psyche, Camb.* **32** : 48–69.
 — 1933. New Thysanoptera from Panama. *Jl N. Y. ent. Soc.* **51** : 407–434.
 — 1939. New North American Thysanoptera, principally from Texas. *Revta Ent., Rio de J.* **10** : 550–619.
 — 1941. A century of new American Thysanoptera II. *Revta Ent., Rio de J.* **12** : 139–243.
 — 1950. Brazilian Thysanoptera II. *Revta Ent., Rio de J.* **21** : 1–113.
 — 1954a. New Thysanoptera, principally Floridian. *Proc. biol. soc. Wash.* **67** : 277–288.
 — 1954b. Brazilian Thysanoptera IV. *Proc. biol. Soc. Wash.* **67** : 17–54.
 — 1956. Brazilian Thysanoptera VI. *Revta bras. Ent.* **4** : 51–160.
 — 1960. Six new Thysanoptera from Brazil. *Revta bras. Ent.* **9** : 57–68.
 Mound, L. A. 1970a. Thysanoptera from the Solomon Islands. *Bull. Br. Mus. nat. Hist. (Ent.)* **24** : 83–126.
 — 1970b. Convoluted maxillary stylets and the systematics of some Phlaeothripine Thysanoptera from *Casuarina* trees in Australia. *Aust. J. Zool.* **18** : 439–463.
 Pitkin, B. R. 1977. The genus *Antillothrips* Stannard, with descriptions of two new species (Thysanoptera: Phlaeothripidae). *Syst. Ent.* **2** : 53–58.
 Priesner, H. 1933. Neue exotische Thysanopteren. *Stylops* **2** : 145–156.
 — 1937. Thysanopterologica V: zwei neue Phlaeothripiden. *Arb. morph. taxon. Ent.* **4** : 347–350.
 — 1949. Thysanopterologica X. *Revue fr. Ent.* **16** : 93–96.
 — 1960. Das System der Tubulifera (Thysanoptera). *Anz. öst. Akad. Wiss.* **13** : 283–296.
 Stannard, L. J. 1950. A new genus of Phlaeothripidae from Mexico. *Proc. ent. Soc. Wash.* **52** : 143–146.
 — 1968. The Thrips or Thysanoptera of Illinois. *Bull. Ill. nat. Hist. Surv.* **29** : 211–552.
 Watson, J. R. & Preer, J. R. 1939. Two new Thysanoptera from Florida. *Fla ent.* **22** : 1–5.
 Zur Strassen, R. 1974. Neue silvicole Fransenflügler von den makaronesischen Inseln (Ins: Thysanoptera). *Senckenberg. biol.* **55** : 105–134.

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